

Physical Science

The Physical Science standards continue to build on skills of systematic investigation with a clear focus on variables and repeated trials. Validating conclusions using evidence and data becomes increasingly important at this level. Students will plan and conduct research involving both classroom experimentation and literature reviews from written and electronic resources. Research methods and skills highlight practical problems and questions. Students will share their work using written reports and other presentations.

The Physical Science standards stress a more in-depth understanding of the nature and structure of matter and the characteristics of energy. The standards place considerable emphasis on the technological application of physical science principles. Major areas covered by the standards include the periodic table; physical and chemical changes; nuclear reactions; temperature and heat; sound; light; electricity and magnetism; and work, force, and motion.

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| <p>PS.1 The student will plan and conduct investigations in which</p> <ul style="list-style-type: none">• length, mass, volume, density, temperature, weight, and force are accurately measured and reported using the International System of Units (SI - metric);• triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, and spring scales are used to gather data;• data from experiments are recorded and interpreted from bar, line, and circle graphs;• research skills are utilized using a variety of resources;• independent and dependent variables, constants, controls, and repeated trials are identified;• valid conclusions are made after analyzing data;• research methods are used to investigate practical problems and questions; and• experimental results are presented in appropriate written form. <p>PS.2 The student will investigate and understand the basic nature of matter. Key concepts include</p> <ul style="list-style-type: none">• the particle theory of matter;• elements, compounds, mixtures, acids, bases, salts, organic, inorganic, solids, liquids, and gases;• characteristics of types of matter based on physical and chemical properties;• physical properties (shape, density, solubility, odor, melting point, boiling point, color); and• chemical properties (acidity, basicity, combustibility, reactivity). <p>PS.3 The student will investigate and understand various models of atomic structure including Bohr and Cloud (quantum) models.</p> | <p>PS.4 The student will investigate and understand how to use the periodic table of elements to obtain information. Key concepts include</p> <ul style="list-style-type: none">• symbols, atomic numbers, atomic mass, chemical families, periods, valence numbers, metals, metalloids, and nonmetals; and• binary compounds (chemical activity, physical properties, formulas, and nature of bonding). <p>PS.5 The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy. Key concepts include</p> <ul style="list-style-type: none">• physical changes (effect of temperature on state, particle size on solubility, and temperature on solubility);• nuclear reactions (products of fusion and fission and their effects on human beings and the environment); and• chemical changes (types of reactions, reactants and products, and balanced equations). <p>PS.6 The student will investigate and understand states and forms of energy and how energy is transferred and transformed. Key concepts include</p> <ul style="list-style-type: none">• potential and kinetic energy;• mechanical, chemical, and electrical energy; and• heat, light, and sound. <p>PS.7 The student will investigate and understand temperature scales, heat, and heat transfer. Key concepts include</p> <ul style="list-style-type: none">• absolute zero, phase change, freezing point, melting point, boiling point, conduction, convection, radiation, vaporization, and condensation; and• applications of heat transfer (heat engines, thermostats, and refrigeration). |
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- PS.8 The student will investigate and understand characteristics of sound and technological applications of sound waves. Key concepts include
- wave length, frequency, amplitude, interference; and
 - technological applications of sound.
- PS.9 The student will investigate and understand the nature and technological applications of light. Key concepts include
- reflection, refraction, particle theory, wave theory; and
 - electromagnetic spectrum.
- PS.10 The student will investigate and understand scientific principles and technological applications of work, force, and motion. Key concepts include
- work, force, mechanical advantage, efficiency, power, horsepower, gravitational force, speed/velocity, mass/weight, Newton's three laws of motion, acceleration; and
 - applications (simple machines, compound machines, powered vehicles, rockets, restraining devices, projectiles).
- PS.11 The student will investigate and understand basic principles of electricity and magnetism. Key concepts include
- static, current, circuits; and
 - magnetic fields and electromagnets.